CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2004-0016
WASTE DISCHARGE REQUIREMENTS

FOR
MENCARINI AND JARWIN, INC., dba CHROME CRAFT
FORMER CHROME CRAFT FACILITY
ENHANCED BIOREMEDIATION PILOT STUDY
SACRAMENTO COUNTY

The California Regional Water Quality Control Board, Central Valley Region (hereafter Regional Board), finds that:

1. Mencarini and Jarwin, Inc., dba Chrome Craft (collectively Discharger) submitted a Report of Waste Discharge on 8 April 2003 and supplemental information on 15 July and 22 September 2003 for a pilot study of enhanced groundwater treatment of chromium using bioremediation. Chrome Craft operated a chrome plating facility at 1819 23rd Street in Sacramento (APN No. 010-0035-006; T8N, R5E, S7 MDB&M; N38° 55' 57" W121° 28' 43") between 1974 and 2000. The property is owned by the Mencarini Family Trust and the Jarwin Family Trust. The property (hereafter referred to as Site) is identified on a vicinity map on Attachment A, and shown in detail on Attachment B, both of which are attached hereto and made part of this Order by reference.

2. In 1991, a breach of a concrete chrome plating containment area released chromium to soil and groundwater. Other compounds also found in groundwater at this site are tetrachloroethene (PCE), trichloroethene (TCE), 1,2-dichloropropane (1,2-DCP), carbon tetrachloride, and chloroform. The Discharger has stated that Chrome Craft did not use any of these compounds.

3. An old brick-lined sewer is adjacent to upgradient monitoring well CC-5, and within 40 feet of upgradient monitoring well CC-4. CC-5 contains the highest concentrations of alkalinity (820 mg/l), sulfate (360 mg/l), and total organic carbon (5.5 mg/l), whereas CC-4 contains the highest concentrations of 1,2-DCP (11 ug/l) and PCE (150 ug/l).

4. Monitoring well data show that shallow groundwater contains hexavalent chromium at concentrations ranging from less than 20 ug/l in side-gradient well CC-2 to 40,000 ug/l in monitoring well CC-1 near the source area. CC-1 also contains 63 ug/l PCE, 9.5 ug/l TCE, 8.3 ug/l carbon tetrachloride, 3 ug/l chloroform. Shallow groundwater is about 18 feet below ground surface with a very slight gradient. Groundwater flow direction is southeasterly, and groundwater velocity is estimated to be about five feet per year.

5. Sacramento County Environmental Management Department has been lead agency at the site since June 2001. Under this oversight, the Discharger is monitoring the existing and any future groundwater monitoring wells quarterly for total chromium and semi-annually for volatile organic compounds. The Discharger additionally sampled all monitoring

wells in June 2003 for total and dissolved concentrations of total and hexavalent chromium, arsenic, lead, copper, ferrous iron, zinc, nickel, alkalinity, nitrate, total and dissolved organic carbon, ammonium, methane, and sulfate. This sampling showed that most of the chromium detected is in the hexavalent form, and that dissolved phase constituents are substantially similar in concentration to the total concentration, with the exception of zinc, which was in greater concentration in the dissolved phase.

6. The Discharger has fully delineated the soil source area, installed five monitoring wells as shown on Attachment B, and submitted a 2 April 2003 *Final Source Control Work Plan* which Sacramento County accepted in a 30 May 2003 letter.

7. In the *Final Source Control Work Plan*, the Discharger proposes to destroy monitoring well CC-1 within the source area, install a new monitoring well (CC-6) downgradient of the source area, excavate and backfill the soil source area (approximately 200-300 cubic yards), and inject Metal Remediation Compound (MRC™) into groundwater within the source area. The Discharger will also install a new monitoring well within the injection area (CC-1A), and downgradient to the east (CC-7). Sacramento County will oversee the installation of the monitoring wells. The location of these proposed new wells are shown on Attachment B.

8. MRC™ is a proprietary compound that slowly releases lactate and organosulfur compounds in groundwater. The lactate is a carbon source that provides food and energy for microorganisms. The aerobic microorganisms consume the available oxygen in groundwater, resulting in conditions favorable to the growth of anaerobic organisms, which thrive in a reducing environment. In these reducing conditions, hexavalent chromium is reduced to trivalent chromium, which is subsequently bound within the metal-organosulfur complex and as chromium hydroxide solids. In reducing conditions, chlorinated organic compounds such as PCE are sequentially dechlorinated to TCE, dichloroethene, vinyl chloride and ethene. Similarly, carbon tetrachloride is dechlorinated to chloroform, dichloromethane, chloromethane and methane. In a mixed anaerobic microbial community, the compounds dichloroethene, vinyl chloride, ethene, carbon tetrachloride, chloroform, dichloromethane, chloromethane, and methane can also be anaerobically oxidized to carbon dioxide, acetate, or ethane. The anaerobic reactions diminish when the lactate is consumed, and aerobic conditions gradually return as groundwater containing dissolved oxygen moves into the reaction zone. Laboratory studies performed by Regenesis, the manufacturer of MRC™, show that the metals are not released from the metal-organosulfur complexes in aerobic groundwater environments. More aggressive oxidizing conditions would be necessary to release metals from these organosulfur compounds and hydroxide solids.

9. The Discharger's objective is twofold: to remediate the soil and groundwater beneath the site and thereby enable the building to be renovated for tenancy, and to evaluate the potential of MRC™ to remediate groundwater at this site.

10. The Discharger conducted a bench scale test demonstrating that MRC™ is effective at converting hexavalent chromium to trivalent chromium in groundwater at this site.

11. The Discharger proposes to inject about four pounds of MRC™ per vertical foot of aquifer (about 13 feet) into each of nine injection points into the shallow groundwater. Regenesis provides software to determine the dosing volume, and it recommends four pounds of MRC™ per linear foot as the minimum dosage rate. The injection area is about 325 square feet, as shown in Attachment C, which is attached hereto and made part of this Order by reference. Groundwater monitoring of amendments, breakdown products, and byproducts will continue until concentrations return to baseline levels. Monitoring well CC-6 is positioned to evaluate the extent of the treatment area.

12. The Discharger conducted baseline sampling in June 2003 for the constituents listed in Finding 5 and in December 2003 for all constituents listed in the MRP attached to the tentative WDRs. The Discharger will routinely monitor for these and other constituents as required in the attached Monitoring and Reporting Program (MRP) No. R5-2004-0016. The Discharger will propose baseline concentrations for these constituents within 90 days of injecting MRC™.

13. Byproducts from the injection and subsequent reactions of MRC™ with groundwater constituents could include sulfate, methane, carbon dioxide, chloroform, methylene chloride, vinyl chloride, chloride, dichloromethane, dichloroethane, and ethene. These are expected to be transitory intermediate compounds subject to continued degradation. The Discharger will monitor for these compounds as well as target constituents in accordance with the attached MRP No. R5-2004-0016.

14. If concentrations of dissolved organic carbon are confirmed to exceed 20 mg/L, or if vinyl chloride is detected in downgradient monitoring wells CC-3 or CC-7, or if vinyl chloride persists in CC-6 for three months concurrently with no detection of the degradation product ethene, then the Discharger will provide a work plan to implement the September 2003 *Contingency Plan.* The *Contingency Plan* includes reinstating aerobic conditions to degrade the dissolved organic carbon or vinyl chloride downgradient of the treatment area by introducing oxygen or the proprietary compound, Oxygen Releasing Compound (ORC™). Regenesis suggested using its product ORC™ to reverse the action of MRC™ should it be warranted. According to bench scale tests performed by the Regenesis, the metal-organosulfur complexes are stable in oxygenated environments. Alternatively, the Discharger has also proposed to extract groundwater from CC-1A to hydraulically contain the dissolution of MRC™. The Discharger provided capture zone calculations and slug test results that show that pollutants in downgradient well CC-3 can be withdrawn by extracting groundwater from monitoring well CC-1. Monitoring well CC-1A will be positioned within 20 feet of CC-1 and screened in the same water-bearing zone, so it is expected to provide the same radius of capture as CC-1.

15. The pilot study and associated monitoring will continue until MRC™ breakdown products and byproducts return to baseline levels, which will conclude the pilot study. At the conclusion of the pilot study, the Board will consider rescinding these WDRs.

16. The injection to waters of the State is subject to regulation under the California Water Code. This Order authorizes the Discharger to inject MRC™ into groundwater subject to specific discharge requirements.

17. The *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, Fourth Edition* (hereafter Basin Plan) designates beneficial uses, establishes water quality objectives, contains implementation plans and policies for protecting waters of the basin, and incorporates by reference plans and policies adopted by the State Board. Pursuant to Section 13263(a) of the California Water Code, waste discharge requirements must implement the Basin Plan.

18. Surface water drainage is to the Sacramento River within the legal boundaries of the Sacramento-San Joaquin Delta. The beneficial uses of the Sacramento-San Joaquin Delta are municipal and domestic supply; agricultural supply; industrial process and service supply; navigation; water contact recreation; noncontact water recreation; warm and cold freshwater habitat; migration of warm and cold freshwater species; spawning of warm freshwater species; and wildlife habitat.

19. The beneficial uses of underlying groundwater are municipal and domestic supply, agricultural supply, and industrial service and process supply.

20. Surrounding land uses are commercial, industrial, and residential.

21. State Water Resources Control Board (SWRCB) Resolution No. 68-16 (hereafter Resolution 68-16 or the "Antidegradation Policy") requires the Regional Board in regulating discharges to maintain high quality waters of the state until it is demonstrated that any change in quality will be consistent with maximum benefit to the people of the State, will not unreasonably affect beneficial uses, and will not result in water quality less than that described in plans and policies (e.g., quality that exceeds water quality objectives). Temporal degradation of groundwater at this site due to the MRC™ injection may occur. The temporary degradation allowed by this Order is consistent with Resolution No. 68-16 since (1) the purpose is to accelerate and enhance remediation of unacceptable concentrations of several waste constituents and such remediation will benefit the people of the state; (2) the discharge facilitates a pilot project to evaluate the effectiveness of cleanup technology in accord with SWRCB Resolution No. 92-49 and is limited in scope and duration; (3) best practicable treatment and control, including adequate monitoring and contingency plans to assure protection of water quality, are required; and (4) the injection will not cause water quality objectives to be exceeded beyond the treatment area or the duration of the project as described in Finding Nos. 11 and 15.

22. Section 13267(b) of California Water Code provides that:

> In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge within its region, or any citizen or domiciliary, or political agency or entity of this state who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste outside of its region that could affect the quality of the waters of the state within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the board requires. The burden, including costs of these reports, shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports. In requiring those reports, the regional board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports.

The technical reports required by this Order and the attached MRP No. R5-2004-0016 are necessary to assure compliance with these waste discharge requirements. The Discharger formerly operated the facility that discharges the waste subject to this Order.

23. The California Department of Water Resources sets standards for the construction and destruction of groundwater wells, as described in California Well Standards Bulletin 74-90 (June 1991) and Water Well Standards: State of California Bulletin 74-81 (December 1981). These standards, and any more stringent standards adopted by the State or County pursuant to California Water Code Section 13801, apply to all monitoring wells.

24. Issuance of this Order is an action to assure the restoration of the environment and is, therefore, exempt from the provisions of the California Environmental Quality Act (Public Resources Code, Section 21000, et seq.), in accordance with Section 15308 and 15330, Title 14, California Code of Regulations (CCR).

25. This discharge is exempt from the requirements of *Consolidated Regulations for Treatment, Storage, Processing, or Disposal of Solid Waste,* as set forth in Title 27, CCR, Section 20005, et seq., (hereafter Title 27). Section 20090(d) allows exemption for a project to clean up a condition of pollution that resulted from an unauthorized release of waste based on the following:

    a. The cleanup and abatement action is under the direction of a public agency;
    b. Wastes removed from the immediate place of release will be discharged according to the Title 27 regulations; and
    c. The remedial actions intended to contain wastes at the place of release shall implement the Title 27 regulations to the extent feasible.

26. Pursuant to California Water Code Section 13263(g), discharge is a privilege, not a right, and adoption of this Order does not create a vested right to continue the discharge.

27. All the above and the supplemental information in the attached Information Sheet, which is incorporated by reference herein, were considered in establishing the following conditions of discharge.

28. The Discharger and interested agencies and persons were notified of the intent to prescribe waste discharge requirements for this discharge and provided with an opportunity for a public hearing and an opportunity to submit written views and recommendations.

29. In a public meeting, all comments pertaining to the discharger were heard and considered.

IT IS HEREBY ORDERED that pursuant to Sections 13263 and 13267 of the California Water Code, Mencarini and Jarwin, Inc., their agents, successors, and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted hereunder, shall comply with the following while conducting the above-described remedial pilot study:

[Note: Other prohibitions, conditions, definitions, and some methods of determining compliance are contained in the attached "Standard Provisions and Reporting Requirements for Waste Discharge Requirements" dated 1 March 1991, incorporated herein.]

A. Discharge Prohibitions

1. Discharge of wastes to surface waters or surface water drainage courses is prohibited.

2. The injection of other than MRC™ into groundwater is prohibited.

3. Discharge of waste classified as 'hazardous' under Section 2521 of Title 23, CCR, or as 'designated' under Section 13173 of California Water Code is prohibited.

4. Discharge of MRC™ at locations or in a manner different from that described in Finding No. 11 is prohibited.

B. Discharge Specifications

1. Discharge of MRC™ at the Site shall be limited to the project scope in Finding 11.

2. No waste constituent shall be released or discharged, or placed where it will be released or discharged, in a concentration or in a mass that causes violation of the Groundwater Limitations.

C. Groundwater Limitations

1. During the enhanced bioremediation pilot study, the Discharger shall not cause an increase above 20 mg/L of dissolved organic carbon or a detection of vinyl chloride in monitoring wells CC-3 or CC-7.

2. Effective upon completion of the pilot study, amendments and byproducts shall not exceed baseline levels.

D. Provisions

1. The Discharger shall notify Board staff a minimum of one week prior to the injection of MRC™.

2. The Discharger shall comply with the attached MRP No. R5-2004-0016, which is part of this Order, and any revisions thereto as ordered by the Executive Officer.

3. The Discharger shall comply with the "Standard Provisions and Reporting Requirements for Waste Discharge Requirements," dated 1 March 1991, which are attached hereto and by reference a part of this Order. This attachment and its individual paragraphs are commonly referenced as "Standard Provision(s)."

4. All of the following reports shall be submitted pursuant to Section 13267 of the California Water Code. All technical reports required herein that involve planning, investigation, evaluation, or design, or other work requiring interpretation and proper application of engineering or geologic sciences, shall be prepared by or under the direction of persons registered to practice in California pursuant to California Business and Professions Code sections 6735, 7835, and 7835.1. To demonstrate compliance with sections 415 and 3065 of Title 16, CCR, all technical reports must contain a statement of the qualifications of the responsible registered professional(s). As required by these laws, completed technical reports must bear the signature(s) and seal(s) of the registered professional(s) in a manner such that all work can be clearly attributed to the professional responsible for the work.

    a. The Discharger shall submit a Pilot Study Implementation Report due no later than **90 days** after injection of MRC™ that shall include a description of field activities, including soil excavation, destruction of monitoring well CC-1, installation of new monitoring wells, results of pre-injection groundwater sampling, and a table of proposed baseline concentrations developed using an EPA-approved statistical method, including the rationale used to develop the concentrations. The Implementation Report should be submitted separately from but may be concurrent with the first quarterly monitoring report that is due subsequent to the adoption of these WDRs.

b. The Discharger shall submit a Pilot Study Evaluation Report no later than **14 months** after the injection of MRC™ that shall include a summary of analytical results, an evaluation of the effectiveness of the MRC™ injections and recommendations. The evaluation should assess whether the remediation has been effective to treat chromium, the influence MRC™ had, if any, on volatile organic compounds, the estimated extent of the treatment area, whether geochemistry has returned to baseline conditions and if not, an estimate of when, and an assessment of the applicability of the treatment to full-scale remediation.

5. In the event that vinyl chloride is detected, or dissolved organic carbon is detected at concentrations exceeding 20 mg/L in monitoring wells CC-3 or CC-7, the Discharger shall immediately notify Regional Board staff of the exceedance and obtain a confirmation sample from that well within **7 days** of receiving the results, and transmit the results to Board staff within **7 days** of receipt. If the confirmation sample results confirm a detection of vinyl chloride or dissolved organic carbon exceeding 20 mg/L in CC-3 or CC-7, then the Discharger shall undertake the following:

   a. Within **30 days** of confirming an exceedance, the Discharger shall submit a work plan to implement one of the contingency plans described in the September 2003 *Contingency Plan for MRC Injection* and described in Finding 14.

   b. Within **30 days** of staff approval or modification of the work plan described in Provision D.5.a., the Discharger shall implement the work plan.

   c. Within **90 days** of implementing the Contingency Plan, the Discharger shall submit a Contingency Plan Implementation Report.

6. In the event that vinyl chloride is detected in CC-6, then the Discharger shall sample CC-6 monthly for volatile organic compounds, including vinyl chloride and ethene, for two addtitional months to determine if the vinyl chloride is degrading. If the subsequent monthly samples contain both vinyl chloride and ethene, then it is determined that vinyl chloride is being degraded in situ and a contingency plan does not need to be implemented. If vinyl chloride is detected in the subsequent monthly samples and ethene is not detected, then the Discharger shall undertake the actions described in Provision D.5.a, b, and c.

7. The Discharger shall comply with all conditions of this Order, including timely submittal of technical and monitoring reports as directed by the Executive Officer. Violations may result in enforcement action, including Regional Board or court order requiring corrective action or imposing civil monetary liability, or in revision or rescission of this Order.

8. The Discharger shall maintain records of all monitoring information including all calibration and maintenance records, copies of all reports required by this Order, and records of all data used to complete the application for this Order. Records shall be maintained for a minimum of three years from the date of the sample, measurement, or report. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Executive Officer.

9. The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control that are installed or used by the Discharger to achieve compliance with this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems which are to be installed by the Discharger only when necessary to achieve compliance with the conditions of this Order.

10. A copy of this Order shall be kept at the discharge facility for reference by operating personnel. Key operating personnel shall be familiar with its contents.

11. While this Order is in effect, and prior to any change in ownership of the Site or management of this operation, the Discharger shall transmit a copy of this Order to the succeeding Owner/Operator, and forward a copy of the transmittal letter and proof of transmittal to the Board.

12. The Regional Board will review this Order periodically and will revise requirements when necessary, and will consider rescinding this Order when the pilot study is completed.

I, THOMAS R. PINKOS, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 30 January 2004.

Original signed by

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THOMAS R. PINKOS, Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2004-0016
FOR
MENCARINI AND JARWIN, INC. dba CHROME CRAFT
FORMER CHROME CRAFT FACILITY
ENHANCED BIOREMEDIATION PILOT STUDY
SACRAMENTO COUNTY

This Monitoring and Reporting Program (MRP) incorporates requirements for monitoring the progress of the enhanced bioremediation pilot study. This MRP is issued pursuant to California Water Code Section 13267. Mencarini and Jarwin, Inc. (Discharger) is required to comply with this MRP. The Discharger shall not implement any changes to this MRP unless and until a revised MRP is issued by the Executive Officer. Groundwater sampling and reporting as directed by Sacramento County are still required. The enhanced bioremediation pilot study consists of injecting Metal Remediation Compound (MRC^{TM}) in groundwater in the source area.

All samples shall be representative of the volume and the nature of the discharge and matrix of the sampled medium. The time, date, and location of each grab sample shall be recorded on the sample chain of custody form.

ENHANCED BIOREMEDIATION PILOT STUDY MONITORING

As shown on Attachment B, there are seven monitoring wells (CC-1-A, CC-2, CC-3, CC-4, CC-5, CC-6, and CC-7) associated with this site. (Existing monitoring well CC-1 will be destroyed, and new monitoring wells CC-1-A, CC-6, and CC-7 will be installed prior to MRC^{TM} injection). The groundwater monitoring program for these six wells and any wells installed subsequent to the issuance of this MRP, shall follow the schedule below. Sample collection and analysis shall follow standard EPA protocol, and analyses shall be completed by a State certified laboratory. Monitoring well samples shall be analyzed for the following constituents and parameters in accordance with the following tables:

Table of Constituents and Methods

Constituents	Analytical Method	Maximum Detection Limit[1]
Depth to Groundwater	---	0.01 ft
pH, electrical conductivity, dissolved oxygen, oxygen-reduction potential	field instrumentation	---
Carbon Dioxide (dissolved)	SM 4500 or ASTM D1945	10 µg/l
Dissolved Organic Carbon	415, 9060, or SM 5310	1,000 µg/l
Total Chromium (dissolved)	200, 6000, or SM 3000	10 µg/l
Hexavalent Chromium (dissolved)	7196	5 µg/l
Ferrous Iron (dissolved)	200, 6020, or SM 3000	100 µg/l

Table continued on following page

Table of Constituents and Methods, con't

Constituents	Analytical Method	Maximum Detection Limit[1]
General Parameters (alkalinity, total dissolved solids, chloride, and nitrate)	Various	Various
Methane (dissolved)	RSK 175M or ASTM D1945	10 µg/l
Sulfate	EPA 300	500 µg/l
Volatile Organic Compounds	8260B	0.5 µg/l

[1] For nondetectable results

Table of Constituents and Monitoring Frequency

Constituents	Monitoring Frequency		
	Monthly	Quarterly	Semi-Annually
Depth to Groundwater	CC-1A	all wells	
pH, electrical conductivity, dissolved oxygen, oxygen-reduction potential	CC-1A	all wells	
Carbon Dioxide (dissolved)			all wells
Dissolved Organic Carbon	CC-1A	all wells	
Total Chromium (dissolved)	CC-1A	all wells	
Hexavalent Chromium (dissolved)			all wells
Ferrous Iron (dissolved)	CC-1A	all wells	
General Parameters (alkalinity, total dissolved solids, chloride, and nitrate)		all wells	
Methane (dissolved)	CC-1A	all wells	
Sulfate	CC-1A	all wells	
Volatile Organic Compounds	CC-1A	all wells	

REPORTING

In reporting monitoring data, the Discharger shall arrange the data in tabular form so that the date, sample type, and reported analytical result for each sample are readily discernible. The data shall be summarized in such a manner to clearly illustrate compliance with waste discharge requirements and spatial or temporal trends, as applicable. The results of any monitoring done more frequently than required at the locations specified in the MRP shall also be reported to the Regional Board.

As required by the California Business and Professions Code Sections 6735, 7835, and 7835.1, all Groundwater Monitoring Reports shall be prepared under the direct supervision of a Registered Engineer or Geologist and signed by the registered professional.

A. Monthly Data Submittals

Monthly data submittals shall be submitted to the Board by the **1st day of the second month following the end of each monthly period (i.e., the Jan report is due by 1 March, etc.).** At a minimum, the monthly submittals shall include tabulated cumulative data tables, copies of current field logs and current analytical laboratory reports, and a cover letter. The monthly submittal corresponding with the quarterly sampling event may be incorporated into the corresponding Quarterly Monitoring Report.

B. Quarterly Monitoring Reports

Quarterly reports shall be submitted to the Board by the **1st day of the second month following the end of each calendar quarter (i.e., by 1 February, 1 May, 1 August, and 1 November**). At a minimum, the reports shall include:

1. A narrative description of all preparatory, monitoring, sampling, and analytical testing activities for the groundwater monitoring. The narrative shall be sufficiently detailed to verify compliance or lack thereof with the waste discharge requirements, this MRP, and the Standard Provisions and Reporting Requirements. The narrative shall be supported by field logs for each well documenting depth to groundwater; parameters measured before, during, and after purging; calculation of casing volume; total volume of water purged, etc.;

2. Groundwater contour maps for all groundwater zones, if applicable;

3. A table showing well construction details such as well number, groundwater zone being monitored, coordinates (longitude and latitude), ground surface elevation, reference elevation, elevation of screen, elevation of bentonite, elevation of filter pack, and elevation of well bottom;

4. Copies of all laboratory analytical report(s) not previously transmitted;

5. Cumulative data tables containing the water quality analytical results and depth to groundwater;

6. An evaluation of the performance of the bioremediation pilot study including an analysis of its effectiveness in destroying the pollutants, and a discussion of the potential for field scale application; and

7. A discussion of compliance and the corrective action taken, if any, as well as any planned or proposed actions needed to bring the discharge into full compliance with the waste discharge requirements.

C. Annual Report

An annual report shall be submitted to the Board by **1 February** of each year. This report shall contain an evaluation of the effectiveness and progress of the remediation, and may be submitted

with the corresponding bi-monthly monitoring report. The annual report shall contain the following minimum information:

1. Tabular summaries of all data collected during the previous year, including groundwater gradient directions;

2. Graphical summaries of chromium concentration changes and key indicators of bioremediation activity such as dissolved iron and dissolved organic carbon;

3. An evaluation of the performance of the MRC™ and an analysis of its effectiveness in destroying the pollutants;

4. A discussion of compliance and the corrective action taken, if any, as well as any planned or proposed actions needed to bring the discharge into full compliance with the waste discharge requirements;

5. A discussion of any data gaps and potential deficiencies/redundancies in the monitoring system or reporting program; and

6. If desired, a proposal and rationale for any revisions to the groundwater sampling plan frequency and/or list of analytes.

A letter transmitting the monitoring reports shall accompany each report. Such a letter shall include a discussion of requirement violations found during the reporting period, and actions taken or planned for correcting noted violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory. The transmittal letter shall contain the penalty of perjury statement by the Discharger, or the Discharger's authorized agent, as described in the Standard Provisions General Reporting Requirements Section B.3.

The Discharger shall implement the above monitoring program as of the date of the Order.

Original signed by

Ordered by: _____

THOMAS R. PINKOS, Executive Officer

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(Date)

INFORMATION SHEET

ORDER NO. R5-2004-0016
MENCARINI AND JARWIN, INC., dba CHROME CRAFT
FORMER CHROME CRAFT FACILITY
ENHANCED BIOREMEDIATION PILOT STUDY
SACRAMENTO COUNTY

Chrome Craft formerly operated a chrome plating facility at 1819 23rd Street in Sacramento. In 1991, a breach in a concrete containment area released chromium to soil and groundwater. Chrome Craft proposes to excavate the contaminated soil source area, and initiate a pilot study to treat the groundwater insitu beneath the source area using the proprietary compound Metal Remediation Compound (MRC™).

MRC™ slowly releases lactate and organosulfur compounds in groundwater. The lactate is a carbon source which provides food and energy for microorganisms. The aerobic microorganisms consume the available oxygen in groundwater, resulting in conditions favorable to the growth of anaerobic organisms, which thrive in a reducing environment. In these reducing conditions, hexavalent chromium is reduced to trivalent chromium, which is subsequently bound within the metal-organosulfur complex. The anaerobic reactions diminish when the lactate is consumed, and aerobic conditions gradually return as groundwater containing dissolved oxygen moves into the reaction zone. Laboratory studies performed by Regenesis, the manufacturer of MRC™, show that the metals are not released from the metal-organosulfur complexes in aerobic groundwater environments.

If vinyl choride is detected, or dissolved organic carbon exceeds 20 mg/L in downgradient monitoring wells CC-3 or CC-7, then the Discharger will provide a work plan to inject Oxygen Releasing Compound, to aerate groundwater, or to extract groundwater from monitoring well CC-1A, depending upon the specific exceedance observed.

Vinyl chloride is a degradation product of tetrachloroethene and trichloroethene which may be produced as a result of the reducing environment induced by the MRC™. Vinyl chloride is not always degraded in anaerobic conditions, but is degraded in an aerobic environment. Therefore, if vinyl chloride is persistently present in monitoring well CC-6 and its degradation product ethene is not detected, the Discharger will submit the work plan described above.

A calculation of the amount of sulfur introduced in the MRC™ shows that at most, if all the sulfur converted to sulfate and no degradation of sulfate occurred, about 4 mg/L of sulfate would be added between the injection area and monitoring well CC-3. Therefore, sulfate is not considered a constituent that should trigger implemention of a contingency plan.